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GLOSSARY

Social cognition – an umbrella term that refers to any information processing that involves social information in the environment, including other people.

Theory of Mind (ToM) – the ability to attribute thoughts and feelings to oneself and others. It is fundamental to Social Cognition.

Emotional processing – information processing that involves emotive material or stimuli, such as positive or negative words, happy or sad faces.

BACKGROUND & AIMS

Amyotrophic Lateral Sclerosis (ALS) has traditionally been perceived as confined to the motor system. Deficits in **emotional processing**, such as emotion recognition from faces, and **social cognition**, such as **Theory of Mind (ToM)** are reported¹, implicating extra-motor areas. Previous studies have mostly relied on inanimate stimuli (static faces, cartoons, etc.) to examine these deficits. The current study adopts videoed vignettes depicting dynamic emotional expressions and social interactions, alongside traditional measures to explore if reported deficits persist in more naturalistic paradigms.

METHODS

Participants

55 ALS patients and 49 controls, matched for age, years of education and premorbid and current IQ.

Neuropsychological tasks

Executive function: Delis–Kaplan Executive Function System (**DKEFS**) card sorting task², Verbal Fluency Index (**VFI**)³, **Hayling Latency** & **Brixton** tests⁴ (all tasks were controlled for motor slowing).

Emotion and social tasks: see Box A. and Figure 1.

Composite scores

Separate composite scores for emotional processing and social cognition (**EMOSOC**) and executive function (**Executive**) by summing standardised scores according to theorised function. Internal consistency for these composite were satisfactory (EMOSOC: $\alpha=.83$; Executive: $\alpha=.78$).

Box A. Emotion and Social Cognition Tasks

The Awareness of Social Inference Test (TASIT)⁵ - Videoed vignettes depicting emotion and exchanges involving sincerity, sarcasm and deception. Assessment comprises an emotion recognition task (**ER**) and two social Interaction interpretation task; one with minimal paralinguistic information (**SI-M**) and one with enriched paralinguistic information (**SI-E**) (see figure 1. a, b)

Revised Reading the Mind in the Eyes (RME)⁶ - A series of faces showing only the eye-region. Participants are asked to select a word which best describes the thoughts or feelings of the character (see figure 1. c).

Happé Cartoons and Scenarios⁷ - Cartoons and scenarios tasks comprise of two types of stimuli: 'ToM' stimuli require 'picking up' on the false beliefs or ignorance of the characters in the picture or story in order to understand the humour. 'Physical' stimuli require no such attributions and the humour relies on physical impossibility or causality. (see figure 1. d, e)



Fig.1 Example of social stimuli

Results

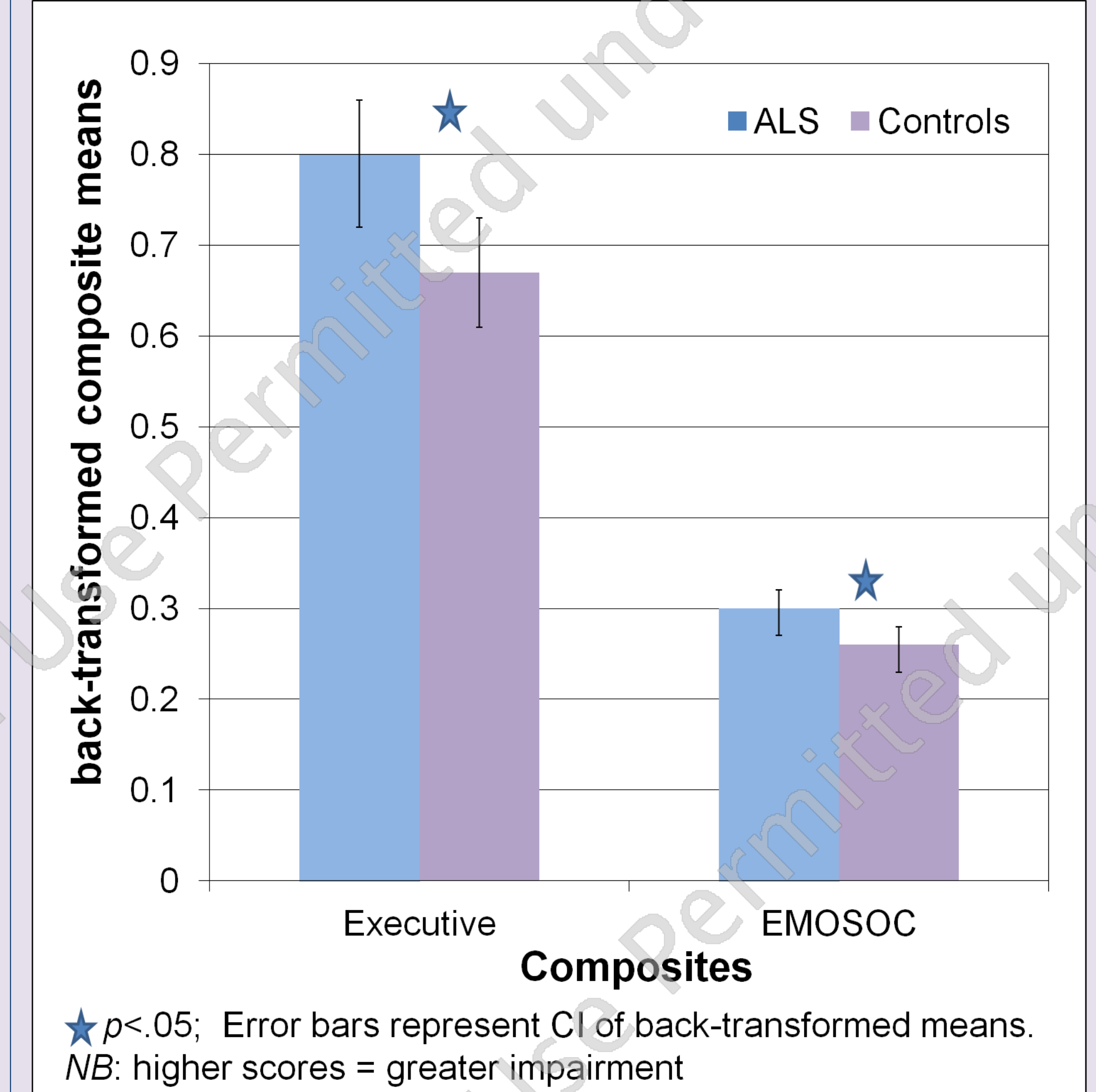
Group-level: MANOVA

A between-groups MANOVA on log transformed data revealed significant differences between patients and controls on a combination of the composite scores ($F[2,101]=4.68$, $p=.011$, $\eta^2=.085$).

Univariate contrasts revealed that patients tended to score higher (were more impaired) for the executive composite ($F[1,102]=8.6$, $p=.004$, $\eta^2=.078$) and the EMOSOC composite ($F[1,102]=5.53$, $p=.021$, $\eta^2=.051$) (see Figure 2).

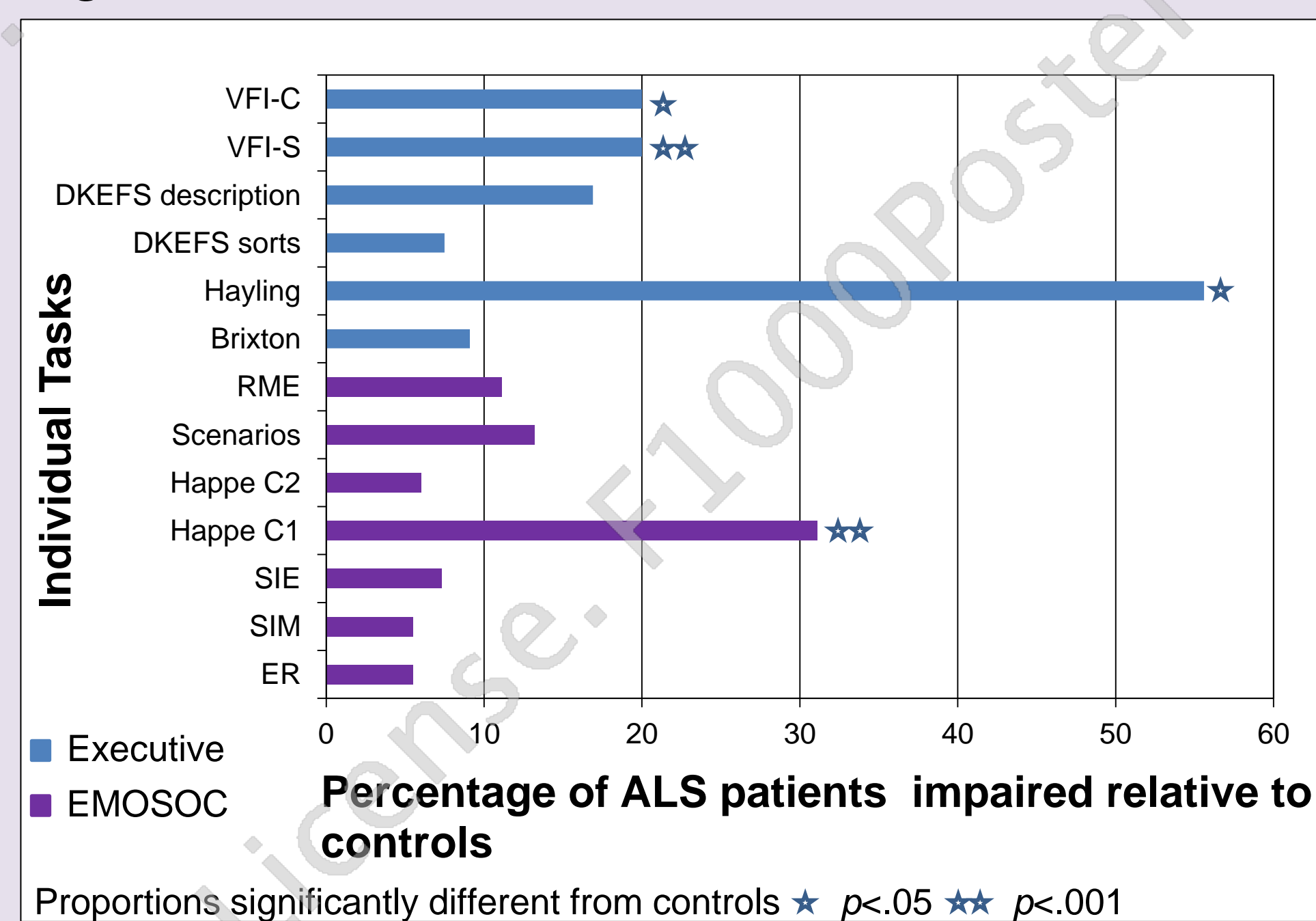
Group membership was maximally differentiated by the executive composite (standardised $b=.79$)

Figure 2. Between-group comparisons on Executive and EMOSOC composites



Single-case analyses

Figure 3. ALS deficits on individual tests



The Bayesian single-case methods⁸ were used to test the null hypothesis that the patient's score on a task is an observation from the scores in the control population. The control population is defined as controls having the same value(s) as the patient on covariate(s) of age, years of education & gender. Figure 3. shows the results of these analyses.

Discussion

- Impaired patient performance relative to controls was found for both Executive and EMOSOC composites. Within the ALS group, single-case analyses revealed heterogeneity of cognitive performance across tasks
- The results are in keeping with previous research using the Happé task which found that ALS patients showed impaired performance on this task relative to controls⁹
- The results are in contrast with other findings which have found impaired emotion recognition in ALS patients relative to controls^{10,11} corroborating the suggestion that impairments on this domain are specific to ALS-FTD patients¹²

Further analyses

- Explore if variables such personality, mood, empathy and cognitive status contribute to any changes in emotion and social cognition in ALS patients.
- Examine if performance on executive and/or social cognition tasks as well as patients' behaviour contribute to caregivers' outcomes (mood, strain, burden, marital satisfaction).

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